

Molecule

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Disposition

- Introduction
- Molecule Framework
 - Processes
 - Channels
 - Termination
 - Scheduling
- Evaluation
- Conclusions

Goal of the project

INTRODUCTION

Objective

*A high-performance library-based
JVM framework enabling
composition of process networks*

Motivation

Existing Frameworks:

1. Callback methods error prone

Node.JS

2. Compiler-based transformations hard to maintain

C# 5.0
(async/await)

3. Exceptional conditions require explicit propagation

Actors

Goroutines

Key Achievements

- Pure Scala-based library
- Compositional I/O using data streams
- Encapsulated system-wide resource and network management
- High-performance parallelism using Flow-parallel scheduling

High-performance safe CSP's

MOLECULE

Processes

- Definition
 - Isolated concurrent sequence of computation
 - Lack of shared (writeable) data
- Design

Callback Style	Compositional Style
<pre>new IO[Baking]((t,k) => kneadAsync(dough => t.submit(bakeAsync(dough, bread => t.submit(eatAsync(bread, result => t.submit(k(result))))))))</pre>	<pre> knead() >>\ dough => bake(dough) >>\ bread => eat(bread)</pre>

Communication

Process Channels



Stream Channels

System-Level Channels

Termination

- Thread Contexts
 - Termination
 - Handling Exceptions
 - Channel Management
- Message Poisoning

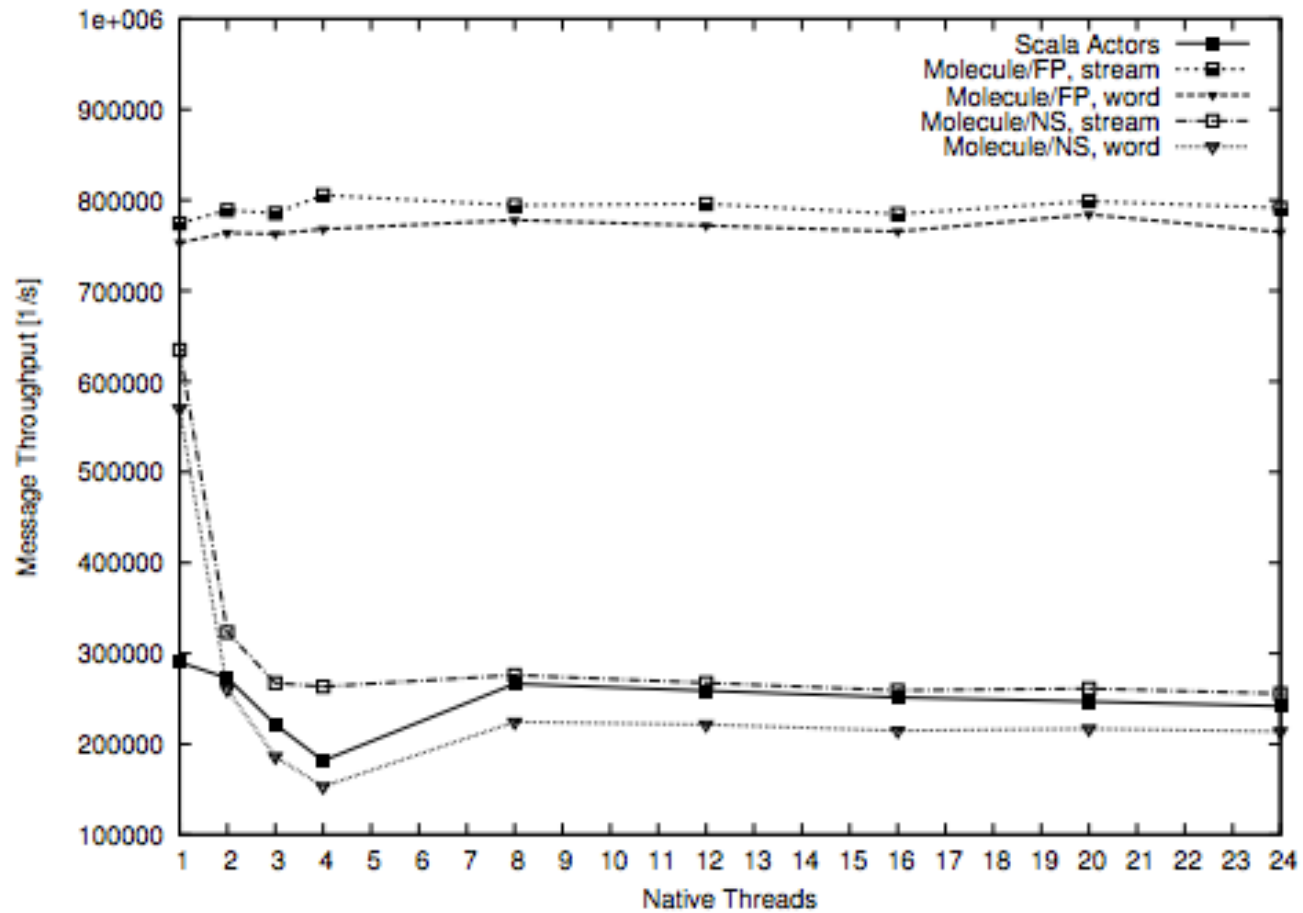
Scheduling

- Naïve Scheduling
- Flow-parallel Scheduling
 - Thread reuse
 - Continuation-based suspension
 - Complexity and Segment-based Thresholds

Benchmarking

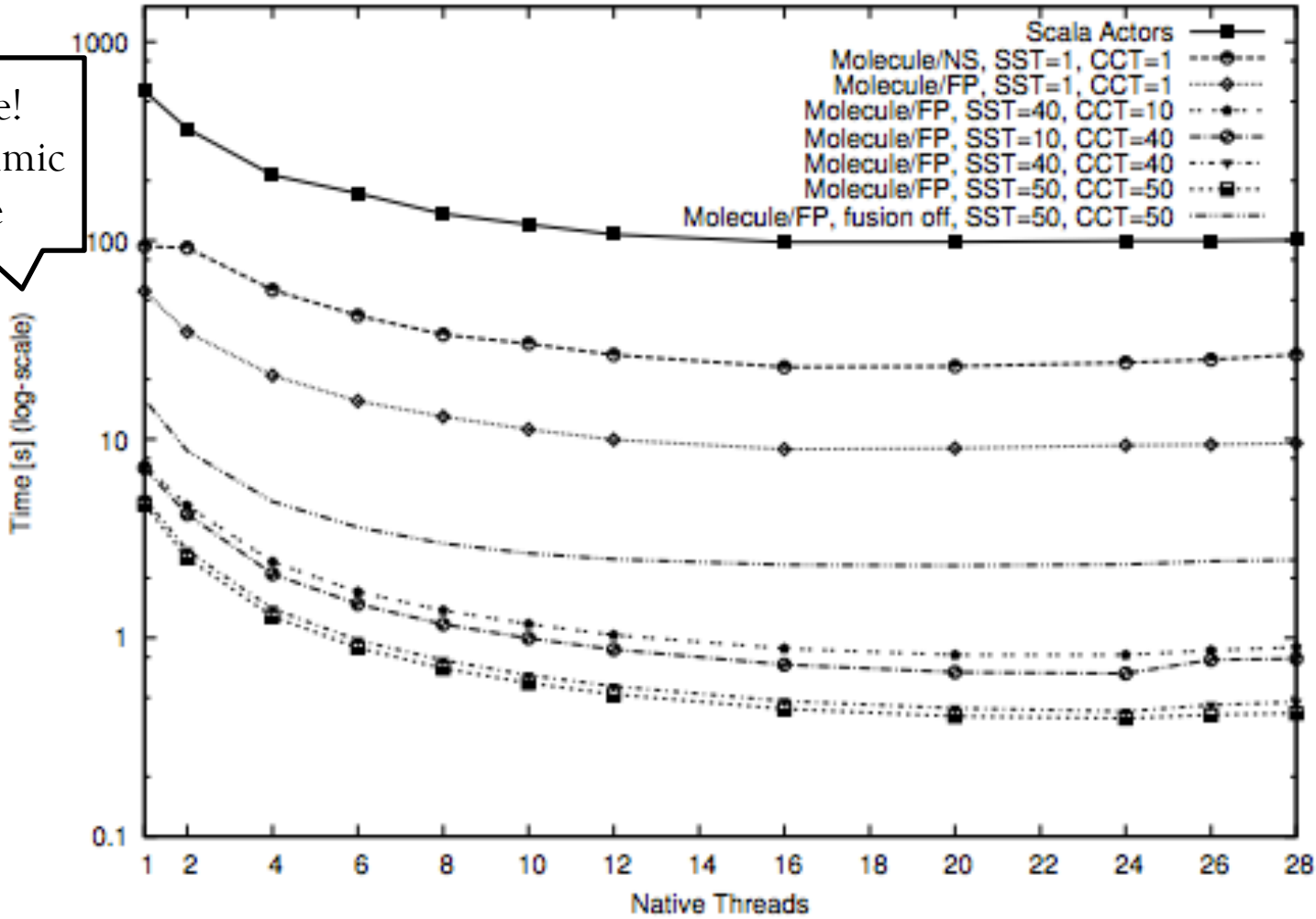
EVALUATION

Thread ring

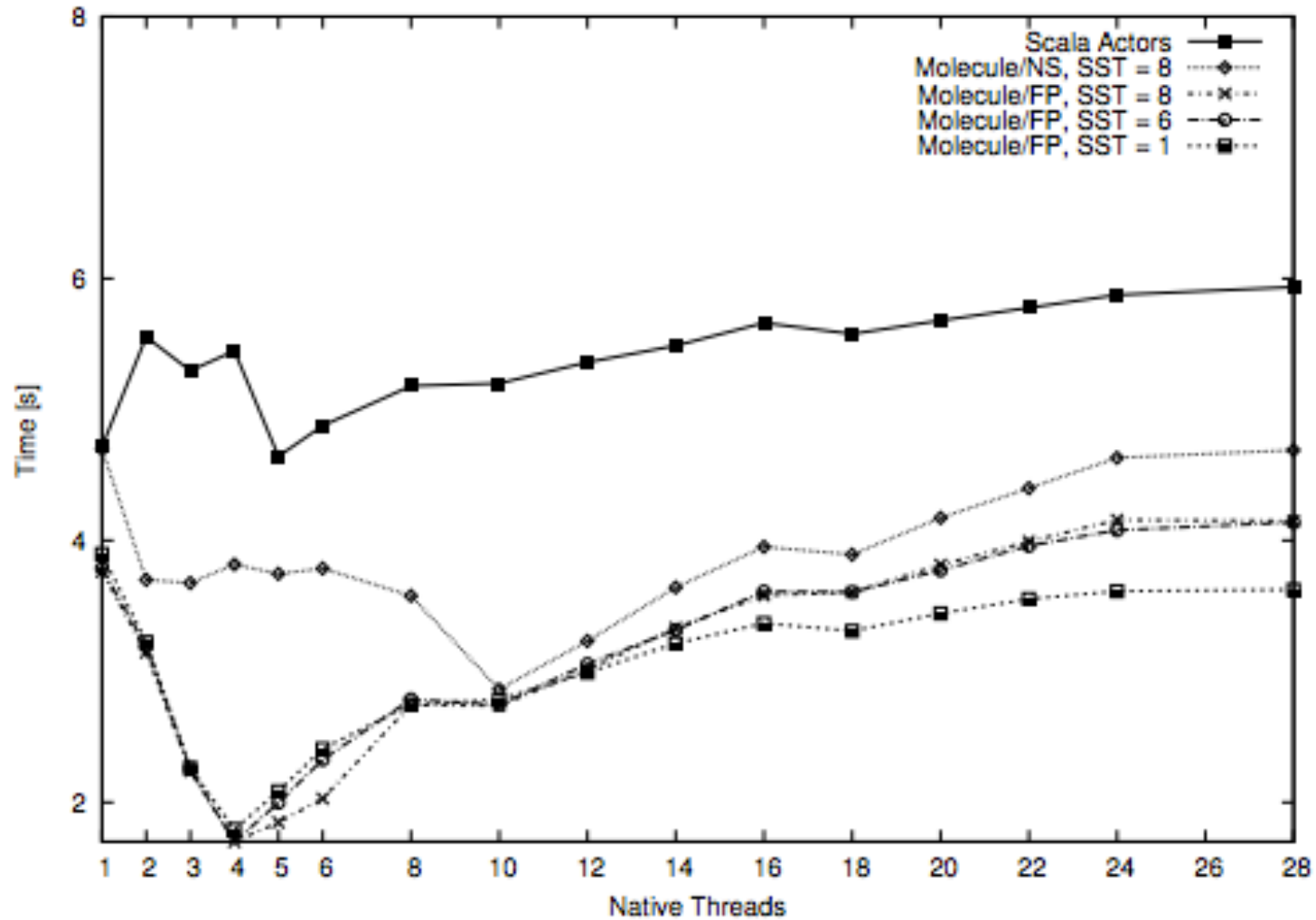


Genuine Prime Sieve

Notice!
Logarithmic
Scale



Chameneos Redux



Criticism and Future work

CONCLUSIONS

Criticism

- The Benchmarking Game
 - Languages
 - Akka/Scalaz/Lift actors
 - Erjang
 - Java
 - Methodology
 - Hotspot Internals: Micro-Benchmarks
- Availability

Future work

- Support plain Java applications
- Examine performance benefits on real-life applications
- Generalize framework ideas to other languages

Commentaries and curiosities

QUESTIONS